

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 August 2001 (02.08.2001)

PCT

(10) International Publication Number
WO 01/54873 A1

(51) International Patent Classification⁷: **B27N 3/14**,
D01G 25/00, D04H 1/72, D21H 27/00

(21) International Application Number: PCT/DK01/00055

(22) International Filing Date: 26 January 2001 (26.01.2001)

(25) Filing Language: Danish

(26) Publication Language: English

(30) Priority Data:
PA 2000 00142 28 January 2000 (28.01.2000) DK

(71) Applicant (for all designated States except US):
SCAN-WEB I/S [DK/DK]; Bryggervej 21, DK-8240
Risskov (DK).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **CHRISTENSEN,**
Kenn, Mosgaard [DK/DK]; Strandborgvej 29, DK-8240
Risskov (DK).

(74) Agent: **K. SKØTT-JENSEN PATENTINGENIØRER**
A/S; Lemmingvej 225, DK-8361 Hasselager (DK).

(81) Designated States (national): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

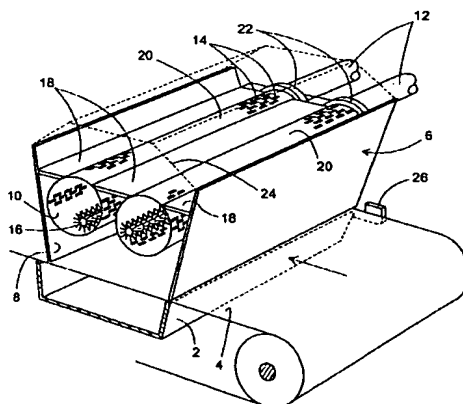
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: APPARATUS FOR DRY-DISTRIBUTING OF FIBROUS MATERIALS



(57) Abstract: In dry-distribution plants for the formation of a course of fibrous materials on a perforated forming wire mesh with an underlying suction box and an overlying fibre distribution box, in which a pair of rotating, perforated drum cylinders are provided for the delivery of a stream of air-fluidised fibre, which is then flung out down on to the wire mesh by the drawing-down of air by the suction box from the upper end of the distribution box, problems have been experienced with regard to the formation of clumps of fibre material on the outer side of the drum cylinders and the inside of the distribution box. With the invention it has been found that these problems can be minimised by arranging cover plates (18) at a distance below the upper level of the drum cylinders, which plates substantially shield-off the free flow of air down through the vertical spaces between the drums themselves and between the drums and the adjacent side walls of the distribution box, in that there will hereby arise an increase in the concentration of the air supply directly down through the drum cylinders, and herewith also an increase in the distribution capacity of the plant.

WO 01/54873 A1

Apparatus for dry-distributing of fibrous materials.

The present invention relates to an apparatus for dry-distributing of fibrous materials for the formation of a course of fibrous material, and more specifically an apparatus of the type which is disclosed in EP-C-0032 772 (DK Patent No. 149979). The apparatus has a forming head which is disposed immediately above a moving wire mesh, under which there is a suction box for the creation of a downwards-leading flow of air in the forming head. This head is configured as a bottom-less and top-less box which extends transversely to the wire mesh and contains a pair of parallel, rotatable drums consisting of perforated plate. At their respective opposing ends, these drums are flow-connected by means of channel bends at 180°, and through the one or the both of these there is blown a stream of air-fluidised fibre which thus circulates axially through the drums.

A part of the air which from the suction box is sucked down through the forming box will pass transversely through the perforated drums, and herewith have a leading-out effect on the fibres, which is supported by the rotation of the drums, which in themselves have a slinging-out effect on the air and herewith on the fibres in the drums. It has been ascertained that with this technique an advantageous distribution of the fibres can be achieved over both the length as well as the breadth of the wire mesh, as well as a quite high capacity for the plant.

In the handling of air-fluidised fibre, problems can easily arise with regard to static electricity, which can not only promote the formation of clumps in the fibres, but can also lead to the attraction of fibre clumps towards the swept surfaces such as the inner sides of said forming box. Therefore, with the relevant technique it is advantageous that a second part of the sucked-down air is brought to flow down

into the clearance arising between the pair of drums and the inner sides of the forming box, in that this air can thus remove fibres and small clumps of fibres which adhere to these side surfaces.

5 However, with the present invention it has been realised that these conditions can be changed considerably by a modification which in principle is quite simple, namely that by means of upper cover plates, a covering can be established of the slot spaces between upper, upwardly-exposed parts of the
10 drum cylinders, and respectively between the drum cylinders, and the spaces between these parts and the adjacent inner sides of the forming box. This would immediately appear to be controversial, the reason being that precisely the sluicing effect which the sucked-down air exercises on the inner sides
15 of the forming box would, after all, be annulled, but the modification must be seen primarily in the light that it will force all the air which is sucked down to pass down through the drums, which will radically change the operational conditions.

20 Firstly, the dosing-out capacity of the drums will be increased to a particularly distinct degree, typically by no less than 60-70%, and secondly the emission of air/fibre from the lower parts of the drums will be so intensified that this emission in itself can counteract the mentioned accumulation
25 of fibres on the inner side of the forming box. The same will apply to a possible accumulation of fibres on the outer side of the drum cylinders around their perforations, as the fibres will be blown out through these openings with greater force than has hitherto been the case, and thus it is a realistic
30 possibility to be able to completely avoid the arranging of hitherto-necessary means such as rotating brush rollers for the cleaning of the outer sides of the drum cylinders.

Moreover, it has proved that the improved result can be achieved while using a reduced suction effect, i.e. with a reduced consumption of energy.

The invention is illustrated by way of example in the drawing, which shows an apparatus with the same basic configuration as that which is disclosed in EP.C-0332772. The apparatus comprises a suction box 2 underneath a perforated forming wire mesh 4, and above this a forming head 6 in the form of a box 8 which is open down towards the wire mesh 4, in which box there extends a pair of perforated drums 10 which are suspended in a manner in which they can rotate, and with connections 12 at their ends. Via not-shown U-pipe-bends, the drum cylinders 10 form a circulation system in which a fibre-loaded stream of air supplied from the one or both ends of the pair of cylinders can circulate during the leading out of air and fibre through the perforations 14 in the cylinder walls. In order to keep the fibres well agitated inside the drum cylinders, in each of these there is housed a quickly-rotating needle roller 16.

As described so far, the apparatus is known, i.e. the air is sucked down to the suction box 2 not only down through the perforated drums 10 but also down through the respective spaces around said drums.

According to the invention, near the upper side level of the drum cylinders 10, slightly down below this level, cover plates 18 are provided which shield off the said space outside these cylinders, so that all of the air to the suction box 2 is now sucked down through the upper, exposed wall parts 20 of the cylinders 10. This will result in a more concentrated emission of fibre directly down towards the wire mesh.

With plants having a broad track, special arrangements will normally be required to achieve the desired degree of sealing between the drum cylinders 10 and the edges of the

plates 18, e.g. a mounting of the drum cylinders in ball bearings 22. The slots do not need to be closed completely, but the more closed they are the more the efficiency increases.

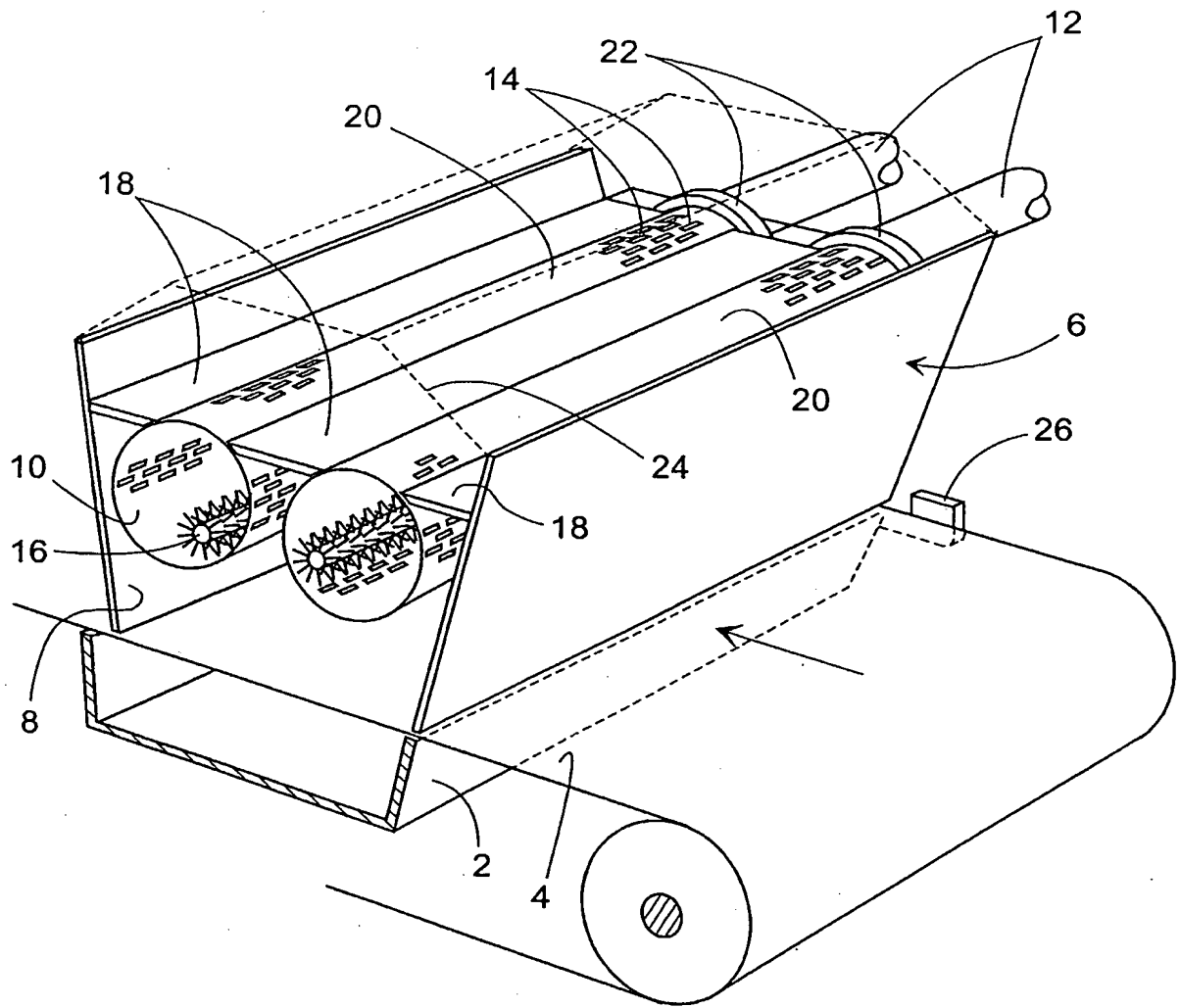
5 It shall be mentioned that with the invention it will be advantageous to work with increased air pressure in a limited space 24 above the plates 18, possibly in connection with a re-circulation of the suction air.

10 It has been customary to make use of a net of bronze wire for the forming wires 4, and it is well-known that these wires must be guided quite precisely with regard to their direction of movement by means of sensor-controlled, adjustable reversing rollers, in that they can not tolerate a crooked running in such a way that they abut with their side edges up
15 against limiting surfaces for the transverse position. In connection with the invention it has now been ascertained that by use of a wire of plastic material, it is possible to avoid the expensive control arrangement, in that such a wire can withstand transverse control simply by contact up against
20 fixed side guides, e.g. as shown at 26.

C L A I M S

1. Apparatus for dry-distributing fibre materials in the formation of a course of fibre material on a moving forming wire mesh, comprising a suction box down under this wire mesh, and above the wire mesh a forming head in the form of an elongated box extending transversely to the wire mesh, and which has an air inlet at the top and is open down towards the wire mesh, and which contains a pair of rotating, perforated drums from which at least one of their ends a stream of air-fluidised fibre is supplied, characterised in that in the upper space of the forming box, in an area at a level between the horizontal diametrical plane of the perforated drums and their upper horizontal tangential plane, cover plate parts (18) are provided for substantial shielding-off of the down-flow of inlet air to the slot areas respectively between the drums and between the drums and the adjacent walls of the box, hereby increasing the concentration of the air supply directly down through the drums.
2. Apparatus according to claim 1, characterised in that the box space above the drums is closed and is connected with means for generation of an over-pressure in this space, possibly in connection with the pressure side of a suction fan unit for the generation of the under-pressure in said suction box.

1/1



INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 01/00055

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B27N 3/14, D01G 25/00, D04H 1/72, D21H 27/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B27N, D01G, D04H, D21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 8701403 A1 (SCANWEB I/S V/H. KONGSTED OG J. MOSGAARD CHRISTENSEN), 12 March 1987 (12.03.87), abstract --	1-2
A	WO 8600097 A1 (SCANWEB I/S), 3 January 1986 (03.01.86), page 5; figure 1 --	1-2
A	WO 8102031 A1 (SCAN-WEB I/S), 23 July 1981 (23.07.81), abstract --	1-2

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

- * "A" document defining the general state of the art which is not considered to be of particular relevance
- * "E" earlier application or patent but published on or after the international filing date
- * "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- * "O" document referring to an oral disclosure, use, exhibition or other means
- * "P" document published prior to the international filing date but later than the priority date claimed

* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

* "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

* "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

* "&" document member of the same patent family

Date of the actual completion of the international search

8 June 2001

Date of mailing of the international search report

25.06.01

Name and mailing address of the ISA/
European Patent Office

Authorized officer

BARBRO NILSSON/EÖ

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 01/00055

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0345234 A2 (YHTYNEET PAPERITEHTAAT OY WALKISOFT ENGINEERING), 6 December 1989 (06.12.89), column 2, line 31 - line 52 -- -----	1-2

INTERNATIONAL SEARCH REPORT
Information on patent family members

30/04/01

International application No.
PCT/DK 01/00055

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	8701403	A1	12/03/87	AU	6337486 A	24/03/87
				DK	151482 B,C	07/12/87
				DK	395585 A	01/03/87
				EP	0235214 A	09/09/87
WO	8600097	A1	03/01/86	AT	37206 T	15/09/88
				AU	582367 B	23/03/89
				AU	4433585 A	10/01/86
				DE	3564971 D	00/00/00
				EP	0168957 A	22/01/86
				EP	0188454 A,B	30/07/86
				JP	2519204 B	31/07/96
				JP	61502689 T	20/11/86
				US	4640810 A	03/02/87
WO	8102031	A1	23/07/81	AT	4232 T	15/08/83
				AU	547989 B	14/11/85
				AU	6774981 A	07/08/81
				BR	8106032 A	24/11/81
				DE	3160607 D	00/00/00
				DK	149979 B,C	10/11/86
				DK	411681 A	16/09/81
				EP	0032772 A,B	29/07/81
				FI	66948 B,C	31/08/84
				FI	812929 A	18/09/81
				JP	3022281 B	26/03/91
				JP	57500059 T	14/01/82
				NO	156656 B,C	20/07/87
				NO	813188 A	18/09/81
				SU	1405709 A	23/06/88
				CA	1150472 A	26/07/83
				NZ	196443 A	14/12/84
				US	4352649 A	05/10/82
EP	0345234	A2	06/12/89	FI	81642 B,C	31/07/90
				FI	882400 A	21/11/89
				JP	2112500 A	25/04/90